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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Siemens Corporation
Intellectual Property Department
170 Wood Avenue South
Iselin, NJ 08830

EXAMINER	
BAREFORD, KATHERINE A	
ART UNIT	PAPER NUMBER
1762	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/733,740	PHILIP ET AL.	
	Examiner	Art Unit	
	Katherine A. Bareford	1762	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 July 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23 and 27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Claims 24-26 are canceled

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35.U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114 was filed in this application after a decision by the Board of Patent Appeals and Interferences, but before the filing of a Notice of Appeal to the Court of Appeals for the Federal Circuit or the commencement of a civil action. Since this application is eligible for continued examination under 37 CFR 1.114 and the fee set forth in 37 CFR 1.17(e) has been timely paid, the appeal has been withdrawn pursuant to 37 CFR 1.114 and prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on July 13, 2007 has been entered.

The amendment filed with the RCE submission of July 13, 2007 has been received and entered. With the entry of the amendment, claims 24-26 are canceled, and claims 1-23 and 27 (including new claim 27) are pending for examination.

The 37 CFR 1.132 Declarations of V. Philip, A. Kulkarni and A. Burns have been received on July 13, 2007.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1-12, 22, 23 and 27 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

(A) Independent claim 1, line 3, as amended July 13, 2007, requires that the composite powder comprise "a mostly unbound homogeneous mixture" of the listed constituents. The Examiner has reviewed the disclosure as originally filed, including page 4, lines 7-9, but does not find support for the mixture of the powder constituents being "unbound" or "mostly unbound". While page 4, lines 7-9 provides that the constituents are mixed together to form a homogenous mixture prior to spraying, there is no teaching or suggestion that the composite powder is "unbound" or "mostly unbound". According to MPEP 2111.01, words of a claim must be given their plain meaning unless applicant has provided a clear definition in the specification. *In re Zletz*, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989). In this case the term "unbound" has not been used in the as filed disclosure and was not given another definition in the specification, and therefore, the Examiner gives the term "unbound" its plain meaning. Furthermore, according to MPEP 2111.01, the "plain meaning" refers to the ordinary and customary meaning given to the term by those of ordinary skill in the art. Therefore, as the "plain meaning" of the term, the Examiner understands "unbound" to mean "not held in chemical or physical combination" (as defined in

Webster's Ninth New Collegiate Dictionary, Merriam-Webster, Inc. (publishers), 1990). In the present originally filed disclosure, the constituents must be in at least physical combination since a "composite powder" comprising a mixture of the constituents is required to used. Therefore, the constituents are held in chemical or physical combination, and thus are not "unbound". Furthermore, as noted in the Board of Appeals decision of May 16, 2007 that affirmed the rejection of claim 1 as to the use of the term "unbound", the description in the specification at page 4 cites mixing by ball milling or wet chemical mixing, which would also such providing a "bound" mixture (see pages 4-5 of the Board decision). As a result, the claims contain new matter.

With the amendment of July 13, 2007, applicant has provided three 37 CFR 1.132 declarations as evidence that the original specification reasonably conveyed to one skill in the art the inventors had possession of the term "unbound". The Examiner has reviewed these declarations, however, they do not overcome the rejection. Each declaration provides opinion evidence from the signer that the mixing by "ball milling" indicates that the constituents are "mostly unbound"
VO or "wet chemical mixing", because (1) the mixed constituents should be unbound and freely flowing so they can enter the LVOF sprayer and the heat generated by the LVOF
VO process can ~~be~~ melt the second constituents such that they surround and encase the first constituents (paragraph 8 of the declarations) and (2) that wet chemical mixing and ball milling would not cause the materials to be "bound" (paragraphs 9-11). The Examiner notes that as discussed in MPEP 716.01(c).III.:

> Although factual evidence is preferable to opinion testimony, such testimony is entitled to consideration and some weight so long as the opinion is not on the ultimate legal conclusion at issue. While an opinion as to a legal conclusion is not entitled to any weight, the underlying basis for the opinion may be persuasive. In re Chilowsky, 306 F.2d 908, 134 USPQ 515 (CCPA 1962).

Furthermore, MPEP 716.01(c).III. goes on to state that:

> In assessing the probative value of an expert opinion, the examiner must consider the nature of the matter sought to be established, the strength of any opposing evidence, the interest of the expert in the outcome of the case, and the presence or absence of factual support for the expert's opinion. Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 227 USPQ 657 (Fed. Cir. 1985), cert. denied, 475 U.S. 1017 (1986).

Here, (1) the nature of the matter sought to be established is discussed with regard to the declarations' purpose above, (2) each of the experts has an interest in the outcome of the case, either as an inventor or an employee of the assignee, and (3) as to the presence or absence of factual support for the expert's opinion, the experts have provided no factual support as to their opinions. On the other hand, (4) as to the strength of any opposing evidence, the Examiner notes that (a) for example, Wang et al (US 6517960) provides that in the thermal spraying art, when making composite powders for thermal spraying made up from mixtures of ceramic materials, that can include zirconia, it is well known to mix the powders by ball mixing, which provides for "interlocking of the powders" (see column 3, lines 1-30) - indicating that the powders will be physically bound. As well, Rangaswamy et al (US 5372845) teaches the known formation of clad particles (which would be physically bound) by ball mixing powders together to form

powders for thermal spraying (see column 7, lines 30-45), and each of the core or cladding powders can be made from ceramics with the use of zirconia described (column 11, lines 25-50). (b) As to "chemical mixing", Wang et al (US 6517690) also provides that when making composite powders for thermal spraying made up from mixtures of ceramic materials, that can include zirconia, it is also well known to mix the powders by using a "sol-gel" (a chemical mixing apparently as defined) or colloidal process "to coat the particles of one constituent with another" (column 3, lines 1-30), thus also providing that the materials would be physically bound. Therefore, when assessing the probative value of the experts' opinion, using all the factors to be considered, in this case, the Examiner finds that factual evidence opposing the experts' opinion is of a strength to overcome the opinion, as it indicates that one of ordinary skill in the art would understand that ball milling and wet chemical mixing would provide a "bound" or "mostly bound" mixture of components. As well, applicant has not addressed the Examiner's position that the constituents must be in at least physical combination since a "composite powder" comprising a mixture of the constituents is required to used. Therefore, the constituents are held in chemical or physical combination, and thus are not "unbound".

(B) Independent claim 5 has been amended to provide that "most of the first and second constituents being freely flowing relative to each other within the homogeneous mixture" in the amendment of July 13, 2007. This is confusing as to what is actually required as discussed in the 35 USC 112, second paragraph rejection below. If applicant

means that most of the first constituents are not attached to second constituents and vice versa, such that with the mixture of particles, individual particles are only first constituents or only second constituents, this is not supported by the disclosure as originally filed. There is no indication as discussed in section (A) above, that the constituents are or are not attached to each other, with the suggestion of wet chemical mixing or ball milling, if anything, indicating that the constituents are attached to each other. Therefore, the claim contains new matter.

(C) New independent claim 27 has been provided which requires mixing "without fusing the fist and second constituents into hollow structures". This negative limitation is not supported by the disclosure as originally filed. As discussed in MPEP 2173.05(i):

> Any negative limitation or exclusionary proviso must have basis in the original disclosure. If alternative elements are positively recited in the specification, they may be explicitly excluded in the claims. See In re Johnson, 558 F.2d 1008, 1019, 194 USPQ 187, 196 (CCPA 1977) ("[the] specification, having described the whole, necessarily described the part remaining."). See also Ex parte Grasselli, 231 USPQ 393 (Bd. App. 1983), aff 'd mem., 738 F.2d 453 (Fed. Cir. 1984). The mere absence of a positive recitation is not basis for an exclusion. Any claim containing a negative limitation which does not have basis in the original disclosure should be rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

Therefore, the claim contains new matter.

(D) New independent claim 27 has been provided which requires that the second constituent "at least partially encases the first constituent" when the coating is applied. The Examiner has reviewed the disclosure as originally filed, however, this is not

supported. At page 5, lines 10-15 only provides that the second constituent "encases" the first constituent, not that they can "partially encase" the first constituent. Therefore, the claim contains new matter.

The other dependent claims do not cure the defects of the claims from which they depend.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1, line 3, requires a composite powder comprising "a mostly unbound homogeneous mixture". This is unclear is worded because it is unclear how much of the mixture must be unbound to be "mostly" unbound. In the Remarks section, at page 7, applicant refers to "mostly" as being more bound than unbound, but there is no indication that this would be what is meant by mostly. Would it be 70% unbound, 90% unbound, etc?

Claim 5, lines 6-8, "most of the first and second constituents being freely flowing relative to each other within the homogeneous mixture." This is unclear as worded. Does it mean that most of the first constituents are not attached to second constituents

and vice versa, such that with the mixture of particles, individual particles are only first constituents or only second constituents? Or does is mean that first and second constituents can be attached to one another, forming individual particles within the mixture made up of both first and second constituents, but that most of the first and second constituents are freely flowing relative to each other because individual particles will flow relative to each other? Either one is possible as worded.

Claim 13, line 4, provides for mixing by "wet chemical mixing", however, it is not clear what is required by such a process.

The other dependent claims do not cure the defects of the claims from which they depend.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under

37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Longo et al (US 44501184) (hereinafter Longo '184) in view of Nagaraj et al (US 2005/0191516) (hereinafter Nagaraj '516).

Longo '184 teaches a method of applying a zirconia (zirconium oxide) based thermal barrier coating. *Column 1, lines 40-50, column 2, lines 25-50 and column 3, lines 5-20.* The applied coating can be porous. *Column 1, lines 40-50, column 4, lines 55-60, and column 5, lines 5-10.* The method includes selecting a composite powder comprising a first constituent that can comprise stabilized zirconia particles. *Column 2, lines 25-50, column 3, lines 5-20 and column 4, lines 60-68 (stabilized zirconia can be used).* The powder also can have a second constituent that can comprise a second ceramic material, such as titanium oxide or cerium oxide. *Column 3, lines 5-20 and column 4, lines 60-68 (note that combinations of the listed materials can be used). (It would have been obvious to select materials from the lists provided by Longo '184 to make a composite powder with an expectation of desirable coating results, as the selection of such materials is taught by Longo '184).* The powder would be a homogenous mixture of the materials. *Column 3, lines 55-60.* The second ceramic material can have a melting temperature sufficiently low so that the second constituent particles can at least partially melt when applied. *Column 3, lines 5-*

20 and column 4, lines 60-68 (given the melting temperatures of cerium oxide (1950 degrees C) and titanium oxide (1640 degrees C) these particles would melt under conventional flame spraying conditions required to at least heat soften the zirconia (melting temperature approximately 2700 degrees C), which is taught at column 1, lines 10-15, where it is indicated that flame spray would involve at least "heat softening" of the coating material). The first and second constituents would mostly be freely flowing with each other, because multiple powders would be produced that are flowable with respect to each other, therefore "most" of first and second constituents in total would not be on any one powder and therefore would flow freely with respect to each other. *Column 4, lines 40-50.* The composite powder can be applied by thermal spraying using a conventional powder-type flame spray equipment (which would be a low velocity oxygen fuel process/LVOF). *Column 2, lines 45-50 and column 1, lines 5-40, as to the term "low velocity oxygen fuel process", this term was not defined in the disclosure as filed, so the Examiner has based her understanding of the term based on the "plain meaning" or ordinary and customary meaning of the term by those of ordinary skill in the art (See MPEP 2111.01), and it is the Examiner's position that as demonstrated by the art in the case, the combustion powder thermal spray process, i.e. the flame spray process, is equated to a "low velocity oxygen fuel process".* The composite powder can also be applied by plasma spraying (another form of thermal spraying). *Column 2, lines 45-50 and column 1, lines 5-30.* The composite spray powder used can also include other ordinary flame spray powders. *Column 5, lines 15-25.*

Longo '184 teaches all the features of these claims except that the LVOF process actually at least partially melts the titanium/cerium oxide particles and the repair of the component while in the machine.

However, Nagaraj '516 teaches that it is well known to need to repair a zirconia based thermal barrier coating. *Paragraphs [0025] and [0032].* Access to a damaged region of a coating on a component in a machine is provided. *Paragraphs [0032] (the part can be in an assembled state) and [0037].* The damaged region is cleaned. *Paragraph [0037] (note the treatment with water, etc.)* Then, a thermal spraying process, plasma spraying, is used to apply repair material to the damaged region without removing the component from the machine. *Paragraphs [0032], [0039], [0040].*

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Longo '184 to at least partially melt the titanium oxide or cerium oxide particles when spraying the composite powder containing zirconia and titanium oxide or cerium oxide with powder flame spraying (LVOF spraying) in order to provide a desirably dense (including porous) and bonded coating, because Longo '184 teaches that conventional flame spray processes at least heat softens the coating material when spraying, and given the melting temperatures of cerium oxide (1950 degrees C) and titanium oxide (1640 degrees C) these particles would melt under conventional flame spraying conditions required to at least heat soften the zirconia (melting temperature approximately 2700 degrees C) constituent of the composite powder. It would further have been obvious to one of ordinary skill in the art at the time the invention was made

to modify Longo '184 to use the process for on machine repair as suggested by Nagaraj '516, in order to provide a desirable repaired barrier layer, because Longo '184 teaches to provide a thermal barrier layer using stabilized zirconia and other ceramic particles and that multiple materials can be present, and Nagaraj '516 teaches thermal spraying ceramic materials to provide repaired zirconia based thermal barrier coatings without disassembling. It would further have been obvious to use the thermal spraying method of flame spraying (LVOF spraying) as well as plasma spraying to provide the thermal barrier coating with an expectation of desirable coating results, because while Nagaraj '516 teaches plasma spraying, Longo '184 teaches that the specific barrier coating compositions taught by Longo '184 can be provided by either flame or plasma spraying with desirable coating results.

9. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Longo et al (US 44501184) (hereinafter Longo '184) in view of Nagaraj et al (US 2005/0191516) (hereinafter Nagaraj '516) and Dittrich (US 3617358).

Longo '184 teaches a method of applying a zirconia (zirconium oxide) based thermal barrier coating. *Column 1, lines 40-50, column 2, lines 25-50 and column 3, lines 5-20.* The applied coating can be porous. *Column 1, lines 40-50, column 4, lines 55-60, and column 5, lines 5-10.* The method includes selecting a composite powder comprising a first constituent that can comprise stabilized zirconia particles. *Column 2, lines 25-50, column 3, lines 5-20 and column 4, lines 60-68 (stabilized zirconia can be used).* The powder

also can have a second constituent that can comprise a second ceramic material, such as titanium oxide or cerium oxide. *Column 3, lines 5-20 and column 4, lines 60-68 (note that combinations of the listed materials can be used). (It would have been obvious to select materials from the lists provided by Longo '184 to make a composite powder with an expectation of desirable coating results, as the selection of such materials is taught by Longo '184).* The second ceramic material can have a melting temperature sufficiently low so that the second constituent particles can at least partially melt when applied. *Column 3, lines 5-20 and column 4, lines 60-68 (given the melting temperatures of cerium oxide (1950 degrees C) and titanium oxide (1640 degrees C) these particles would melt under conventional flame spraying conditions required to at least heat soften the zirconia (melting temperature approximately 2700 degrees C), which is taught at column 1, lines 10-15, where it is indicated that flame spray would involve at least "heat softening" of the coating material).* The powder would be a homogenous mixture of the materials. *Column 3, lines 55-60.* The composite powder can be applied by thermal spraying using a conventional powder-type flame spray equipment (which would be a low velocity oxygen fuel process/LVOF). *Column 2, lines 45-50 and column 1, lines 5-40, as to the term "low velocity oxygen fuel process", this term was not defined in the disclosure as filed, so the Examiner has based her understanding of the term based on the "plain meaning" or ordinary and customary meaning of the term by those of ordinary skill in the art (See MPEP 2111.01), and it is the Examiner's position that as demonstrated by the art in the case, the combustion powder thermal spray process, i.e. the flame spray process, is equated to a "low velocity oxygen fuel process".* The composite powder can

also be applied by plasma spraying (another form of thermal spraying). *Column 2, lines 45-50 and column 1, lines 5-30.* The composite spray powder used can also include other ordinary flame spray powders. *Column 5, lines 15-25.* Long '184 teaches that particles are formed by a process that can include the spray drying process of US Patent No. 3,617,358. *Column 2, lines 50-60.* Longo '184 also teaches that the powdered raw materials are blended together as part of the particle making process. *Column 3, lines 5-20.*

Longo '184 teaches all the features of these claims except that the LVOF process actually at least partially melts the titanium/cerium oxide particles, the repair of the component while in the machine, and the use of "ball milling" or "wet chemical mixing".

However, Nagaraj '516 teaches that it is well known to need to repair a zirconia based thermal barrier coating. *Paragraphs [0025] and [0032].* Access to a damaged region of a coating on a component in a machine is provided. *Paragraphs [0032] (the part can be in an assembled state) and [0037].* The damaged region is cleaned. *Paragraph [0037] (note the treatment with water, etc.)* Then, a thermal spraying process, plasma spraying, is used to apply repair material to the damaged region without removing the component from the machine. *Paragraphs [0032], [0039], [0040].*

Dittrich teaches that when making agglomerated particles of two main constituents by spray drying, the constituents can first be mixed by ball milling to form

a combined particle. *Column 7, lines 55-65.* Then a spray drying process occurs. *Column 7,line 55 through column 9, line 35.*

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Longo '184 to at least partially melt the titanium oxide or cerium oxide particles when spraying the composite powder containing zirconia and titanium oxide or cerium oxide with powder flame spraying (LVOF spraying) in order to provide a desirably dense (including porous) and bonded coating, because Longo '184 teaches that conventional flame spray processes at least heat softens the coating material when spraying, and given the melting temperatures of cerium oxide (1950 degrees C) and titanium oxide (1640 degrees C) these particles would melt under conventional flame spraying conditions required to at least heat soften the zirconia (melting temperature approximately 2700 degrees C) constituent of the composite powder. It would further have been obvious to one of ordinary skill in the art at the time the invention was made to modify Longo '184 to use the process for on machine repair as suggested by Nagaraj '516, in order to provide a desirable repaired barrier layer, because Longo '184 teaches to provide a thermal barrier layer using stabilized zirconia and other ceramic particles and that multiple materials can be present, and Nagaraj '516 teaches thermal spraying ceramic materials to provide repaired zirconia based thermal barrier coatings without disassembling. It would further have been obvious to use the thermal spraying method of flame spraying (LVOF spraying) as well as plasma spraying to provide the thermal barrier coating with an expectation of desirable coating results, because while Nagaraj

'516 teaches plasma spraying, Longo '184 teaches that the specific barrier coating compositions taught by Longo '184 can be provided by either flame or plasma spraying with desirable coating results. It would further have been obvious to modify Longo '184 in view of Nagaraj to use ball milling when making the composite powder as suggested by Dittrich, in order to provide a desirable powder because Longo '184 teaches to use a powder making process as described by Dittrich (US 3617358) and Dittrich teaches to use ball milling as part of the composite powder making process.

10. Claims 14-15 and 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Longo '184 in view of Nagaraj '516 and Dittrich as applied to claim 13 above and further in view of Japan 2002-275615 (hereinafter '615).

Longo '184 in view of Nagaraj '516 and Dittrich teaches all the features of these claims except (1) the calcium or strontium titanate (claims 14-15) and (2) the coefficient of thermal expansions (claims 17-19).

However, '615 teaches that a desirable material to be applied by thermal spraying to a substrate to form a thermal barrier coating is calcium titanate ($CaTiO_3$), which can be applied with yttria stabilized zirconia. *See the abstract.*

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Longo '184 in view of Nagaraj '516 and Dittrich to use calcium titanate particles as suggested by '~~165~~ 615 with the stabilized zirconia—titanium

oxide particles of Longo '184, in order to provide a desirable barrier layer, because Longo '184 in view of Nagaraj '516 and Dittrich teaches to provide a thermal barrier layer using stabilized zirconia and particles that can be titanium oxide and that multiple materials can be present, and '615 teaches the desirability of using stabilized zirconia and to add a form of titanium oxide, calcium titanate, to form thermal barrier coatings. Given the temperature of spraying, the titanate would also partially melt. Furthermore, it would further have been obvious to modify Longo '184 in view of Nagaraj '516 and Dittrich in view of '615 to use strontium titanate with an expectation of providing a desirable thermal barrier coating, because Longo '184 in view of Nagaraj '516 and Dittrich and '615 indicate the desirability of using stabilized zirconia and titanium oxide materials when forming thermal barrier coatings, and it is the Examiner's position that strontium titanate is a well known titanium oxide material. As a result of using the stabilized zirconia and specific titanium oxide materials, the claimed ranges of the coefficients of thermal expansion would be inherently provided as in claims 17-19.

11. Claims 16 and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Longo '184 in view of Nagaraj '516 and Dittrich as applied to claim 13 above, and further in view of Spitsberg et al (US 2003/0027012).

Longo '184 in view of Nagaraj '516 and Dittrich teaches all the features of these claims except (1) the sodium-zirconium-phosphate-silicate (claim 16) and (2) the thermal conductivity (claims 20-21).

However, Spitsberg teaches that a desirable material to be applied by thermal spraying to a substrate to form a thermal barrier coating is zirconium phosphate materials (NZP-family materials), including sodium zirconate phosphate, which are applied with yttria stabilized zirconia (YSZ). *Paragraphs [0022] and [0025].*

It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Longo '184 in view of Nagaraj '516 and Dittrich to use NZP material particles as suggested by Spitsberg with the stabilized zirconia—titanium oxide particles of Longo '184, in order to provide a desirable barrier layer, because Longo '184 in view of Nagaraj '516 and Dittrich teaches to provide a thermal barrier layer using stabilized zirconia and other ceramic particles and that multiple materials can be present, and Spitsberg teaches the desirability of using stabilized zirconia and a form of NZP materials to form thermal barrier coatings. Given the temperature of spraying, the NZP materials would also at least partially melt. It would further have been obvious to modify Longo '184 in view of Nagaraj '516 and Dittrich in view of Spitsberg to use sodium-zirconium-phosphate-silicate with an expectation of providing a desirable thermal barrier coating, because Longo '184 in view of Nagaraj '516 and Dittrich and Spitsberg indicate the desirability of using stabilized zirconia and NZP materials, including those with sodium zirconate phosphate when forming thermal barrier coatings, and it is the Examiner's position that sodium-zirconium-phosphate-silicatis a well known NZP material. As a result of using the stabilized zirconia and

NZP materials, the claimed ranges of the coefficients of thermal conductivity would be inherently provided as in claims 20-21.

Response to Arguments

12. Applicant's arguments filed July 13, 2007 have been fully considered but they are not persuasive.

(A) As to the arguments as to the 35 USC 112, first paragraph, new matter rejection, they have been addressed in the 35 USC 112, first paragraph section above.

(B) As to the rejection under 35 USC 103, applicant argues that claim 5 has been amended to recite that the coating is porous and that most of the first and second constituents are free flowing. The Examiner has reviewed these arguments, however, the rejection is maintained. Longo '184 provides a porous coating as discussed in the rejection above. As to the free flowing constituents, this is provided by Longo '184 as discussed in the rejections above.

(C) As to the rejection under 35 USC 103, applicant argues that claim 13 has been amended to recite that the coating is porous and that the mixture is mixed by ball milling or wet chemical mixing. The Examiner has reviewed these arguments, however, the rejection is maintained. Longo '184 provides a porous coating as discussed in the rejection above. As to the ball milling, this is provided by the further reference to Dittrich as discussed in the rejection above.

(D) As to new claim 27, this is rejected under 35 USC 112, first paragraph as containing new matter as discussed in that section above.

13. The Examiner notes that the July 13, 2007 declaration of Andrew Burns, in paragraph 1, it refers to the declaration as being by "Vinod Philip". The Examiner understands this to be a typographical error, and that "Andrew Burns" was intended to be used. If applicant disagrees, he should so respond on the record.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Katherine A. Bareford whose telephone number is (571) 272-1413. The examiner can normally be reached on M-F(6:00-3:30) with the First Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone numbers for the organization where this application or proceeding is assigned are (571) 273-8300 for regular communications and for After Final communications.

Other inquiries can be directed to the Tech Center 1700 telephone number at (571) 272-1700.

Furthermore, information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

KATHERINE BAREFORD
PRIMARY EXAMINER